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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,399	10/30/2003	Supratik Guha	YOR920030425US1	3291

23334 7590 04/07/2005

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EXAMINER	
JAGAN, MIRELLYS	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EA

Office Action Summary	Application No.	Applicant(s)	
	10/699,399	GUHA ET AL.	
	Examiner	Art Unit	
	Mirellys Jagan	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-13 and 15-28* is/are pending in the application.

4a) Of the above claim(s) *11,12 and 23* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,8-10,13,15-22 and 24-28* is/are rejected.

7)☒ Claim(s) *7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of species 1 in the reply filed on 1/26/05 is acknowledged. The election/restriction requirements stated in the last Office action, dated 11/15/04, is hereby repeated and thus made final.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 13 and 15-22 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01.

In claim 13, the omitted steps are the steps for measuring thermal distributions. As currently written, claim 13 claims a method for detecting photons, and not a method for measuring thermal distributions as stated in the preamble. Claims 15-22 are rejected for being dependent on rejected base claim 13.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 24-28 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,844,208 to Tustaniwskyj et al [hereinafter Tustaniwskyj].

Tustaniwskyj discloses a system comprising:

an electronic device;

a duct (14'') adapted to be physically coupled directly with the electronic device; and

a coolant (14b) flowing through the duct so as to cool the electronic device;

wherein the duct and coolant are at least partially transparent to photons with wavelengths between about 0.1-20 μm (are transparent to IR radiation) which allows a thermal measurement of the device to be made from an exterior of the duct during a normal operation of the device, and the duct comprises silicon (see figures 1, 20, and 21; column 13, line 66-column 14, line 19; and column 14, line 65-column 15, line 3).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3, 8-10, 13, 15, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,251,706 to Paniccia in view of Tustaniwskyj.

Paniccia discloses a system for measuring a thermal distribution of an electrical device during operation, the system comprising:

a passive heat sink having a IR-transparent window (520) made of sapphire or silicon, wherein the window of the heat sink is directly coupled to the device (502), i.e., the device forms a side of the heat sink, to allow the heat generated by the device to dissipate in order cool the device; and

a photon detector comprising an IR camera (760) located adjacent the heat sink and the device to detect photons for use in generating a thermal distribution (thermal map) of the device based on information received from the IR camera, the camera capturing thermal information from the device during operation of the device under conditions for which the device is designed (see figure 7D; and column 7, lines 17-37).

Paniccia does not disclose the heat sink being an active heat sink comprising a duct having a coolant flowing through the duct to cool the device; the duct and the coolant being at least partially transparent to photons with wavelengths between about 0.1-20 microns; and the duct comprising one of silicon, quartz, sapphire, glass, and diamond.

Tustaniwskyj discloses a heat sink (14'') for an electronic device (11) for removing heat generated by the device. The heat sink is an active heat sink that comprises a duct defining a chamber therein having a first transparent window (14f'') and a second transparent window (14e''), and an inlet and an outlet port for directing a heat-transferring liquid coolant (14b) into and out of the duct, wherein the heat sink is directly coupled to the device, i.e., the device forms a side of the heat sink. The liquid and first and second windows are transparent to IR radiation, i.e., have a wavelength between about 0.1-20 microns, wherein the windows are made of silicon. The second window of the heat sink is placed in direct thermal contact with the electronic device to remove the heat generated by the device (see figures 1, 20, and 21; column 13, line 66-column

14, line 19; and column 15, lines 1-3). The fluid of the active heat sink absorbs the heat generated by the device and removes the heat from the device, thereby cooling the device.

Referring to claims 1 and 13, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Paniccia by replacing the passive heat sink with an active heat sink, as taught by Tustaniwskyj, in order to carry away heat from the device with the coolant, thus providing faster cooling of the device.

Furthermore, referring to claims 13, 15, and 20-22, in using the system disclosed by Paniccia and Tustaniwskyj above when measuring the thermal distribution of the device, the method steps of claims 13, 15, and 20-22 will be naturally followed.

8. Claims 4, 6, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paniccia and Tustaniwskyj, as applied to claims 1, 3, 8-10, 13, 15, and 20-22 above, and further in view of U.S. Patent Application Publication 2004/000157 to Imada et al [hereinafter Imada].

Paniccia and Tustaniwskyj disclose a system and method having all of the limitations of claims 4, 6, 16, and 18, as stated above in paragraph 7, but are silent as to the type of liquid coolant used, and therefore do not explicitly disclose the coolant being water or one of perfluorooctane, perfluorohexane, octane, hexane, and carbon tetrachloride.

Imada discloses that either of water, octane, hexane, or carbon tetrachloride is useful as liquid coolants in a cooling heat sink for electronic devices (see paragraph 67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system and method disclosed by Paniccia and Tustaniwskyj by using water, octane, hexane, or carbon tetrachloride as the liquid coolant, since Imada teaches

that water, octane, hexane, or carbon tetrachloride are all useful liquid coolants for use in a heat sink.

9. Claims 5 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paniccia and Tustaniwskyj, as applied to claims 1, 3, 8-10, 13, 15, and 20-22 above, and further in view of U.S. Patent 5,411,077 to Tousignant.

Paniccia and Tustaniwskyj disclose a system and method having all of the limitations of claims 5 and 17, as stated above in paragraph 7, but are silent as to the type of liquid coolant used, and therefore do not explicitly disclose the coolant being one of alkanes and perfluoroalkanes.

Tousignant discloses that alkanes are useful as liquid coolants in a cooling heat transfer device for electronic devices (see column 9, lines 27-47).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system and method disclosed by Paniccia and Tustaniwskyj by using alkanes as the liquid coolant, since Tousignant teaches that alkanes are useful liquid coolants for use in heat exchange for electronic devices.

Allowable Subject Matter

10. Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claim 19 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action, and to include all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose or suggest the following in combination with the remaining limitations of the claims:

A system for measuring thermal distributions of an electronic device during operation, the system comprising a duct adapted to be coupled with an electronic device, wherein the electronic device forms one side of the duct (see claim 7).

A method for measuring thermal distributions of an electronic device during operation, wherein a duct is adjacent to the electronic device, and the electronic device forms one side of the duct (see claim 19).

Response to Arguments

13. Applicant's arguments filed 1/26/05 have been fully considered but they are not persuasive.

Applicant's arguments that the step of measuring thermal distributions is claimed in the claimed step of detecting photons by a photon detector are not persuasive since the photons detected by the photon detector can be used to obtain measurements other than temperature distributions, e.g., can be used to obtain a temperature measurement (paragraph 53 of the

specification). Therefore, the step of detecting photons is not exclusive to determining a thermal distribution as suggested by Applicant.

Applicant's arguments that Tustaniwskyj fails to anticipate claims 24 and 26 because he fails to disclose the heat sink being physically coupled directly to the electronic device are not persuasive since Tustaniwskyj discloses that the heater element (13c) can be removed so that the heat sink (14) is physically coupled directly to the electronic device (11) (see figure 21; and column 14, line 65-column 15, line 3).

Applicant's arguments that Paniccia fails to disclose a coolant flowing through a duct so as to cool the electronic device, and that Tustaniwskyj fails to disclose using a photon detector to measure thermal distributions of the electronic device, are not persuasive since the rejections are based on the combination of these references, wherein the Paniccia reference discloses using a radiation detector to measure thermal distributions of an electronic device through a radiation transparent heat sink, and Tustaniwskyj discloses a radiation transparent heat sink having coolant flowing therethrough so as to cool an electronic device. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Furthermore, Applicant's argument that the Tustaniwskyj reference fails to disclose the coolant flowing over the back side of the die, as occurs in Applicants invention, are not persuasive since the features upon which applicant relies, i.e., the coolant flowing over the die (in direct contact with the die) are not recited in the rejected claim(s). Although the claims are

interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant's arguments that the combination of Paniccia and Tustaniwskyj fails to disclose the limitations of claims 1 and 13 taken as a whole because the combination of Paniccia and Tustaniwskyj does not disclose a coolant flowing through the duct, wherein the duct and the coolant are at least partially transparent to photons, are not persuasive since the combination of Paniccia and Tustaniwskyj results in an electronic device having a duct with coolant flowing therethrough wherein the duct and the coolant are at least partially transparent to photons, as stated above in paragraph 7.

Applicant's argument that the Examiner's conclusion of obviousness for combining Paniccia and Tustaniwskyj is improper because the Examiner relies on "common knowledge" and "common sense" as the motivation to combine Paniccia and Tustaniwskyj are not persuasive since "common sense" or "common knowledge" was not used by the Examiner as a motivation in the rejections. The Examiner established obviousness by relying on the teachings of the Paniccia and Tustaniwskyj references themselves, wherein the heat sink of Paniccia does not carry away the heat from the semiconductor device, but instead only allows it to dissipate from the electronic device, whereas the heat sink of Tustaniwskyj uses a cooling fluid to carry away the heat from the semiconductor device.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 11AM to 4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ
March 28, 2005

G. Verbitsky

GAIL VERBITSKY
PRIMARY EXAMINER